1. *Apoica pallida*, one of the social wasps of Brazil, in the daytime rests quietly in its nest, which resembles the nest of our *Polistes gallica*, but is attached to the twig of a tree. During the evening it looks after flowers, and, whether sitting on them, and sucking their honey, or flying about in the moon-light, by its moonlike colour it is protected from its enemies. It differs from the allied species, which have diurnal habits, in the largeness of its ocelli.

2. One of the solitary Apidæ of Itajahy, belonging to the family of Andrenidæ (*Eophila matutina*, F. and H. Müller) has the singular habit of visiting flowers exclusively in the twilight of earliest morning, and is also provided with unusually large ocelli.

3. A species of *Dorylidæ*, probably belonging to the genus *Labidus*, found, Oct. 1875, by my brother's daughter Anna, late in the evening, flying towards the candle-light, is likewise remarkable for strikingly large ocelli. Concerning *Dorylus*, Gerstaecker says: Ocelli large, bladdered ("Ocellen gross, blasig"); and Westwood (Introduct. vol. ii., p. 216), "Mr. Burchell has informed me that the African species of Dorylus is nocturnal in its habits."

Can any of your readers give further information about the function of the ocelli? HERMANN MÜLLER

Lippstadt, Dec. 18

The House-fly

SOME months ago there were several notices in NATURE as to the death of house-flies, caused by a parasitic fungus. One instance only has come under my observation.

Certainly not later than the first week of last October I saw a fly standing dead on the outside of the pane of my window, surrounded with a small cloud of dust. After a day or two the fly fell off; but the curious part of the matter is that at this moment (Dec. 20), the dust is still on the window-pane. The spaces where the legs were are left sharp and clear, and the cloud, thickest close around them and under the place of the body, thins out gradually round to the distance of above an inch. Looked at through the window-glass (I cannot get at the outside), a pocket-lens resolves it into nothing more than coarser dust, presenting much the appearance of iron filings round the pole of a magnet, in the manner it diverges from the centre. Can any microscopist inform me, through NATURE, whether the fungus actually takes root on the glass, or by what means it has been able to maintain its adherence through the many drenchings of rain and snow to which the window has been exposed during this stormy season? M. E.

Mountfield, Sussex, Dec. 20

The true Nature of Lichens

The writer of the criticism on "Haeckel's History of Creation," in NATURE, vol. xiii. p. 121, will confer a favour on British Lichenologists if he will explain what he means by asserting that "the true nature of Lichens has been cleared up" of late years. W. LAUDER LINDSAY

[The reviewer referred to the investigations of Prof. Schwendener, of Basel: "Untersuchungen über den Flechtenthallus" (Nägeli's *Beiträge zur wiss. Botanik*, 1868), and "Eröterungen zur Gonidienfrage" (*Flora*, May, 1872). A translation of the latter paper appeared in the *Quarterly Journal of Microscopical Science* (vol. xiii. p. 235). See also "A *resumé* of recent views respecting the Nature of Lichens," by Mr. Archer (*ibid*, 1873, p. 217), and "Sexual Reproduction of Thallophytes," by Prof. Thiselton Dyer, in the same journal for last July, p. 296.—ED.]

The Boomerang

TRUSTWORTHY information respecting the performance of the boomerang is a *desideratum*. Reports from professed eye-witnesses as to its behaviour are frequently highly sensational and perplexing. It has been seen, so it is said, to strike an object with great violence and then to return to the hand of the projector! That its rapid rotation round the shortest axis passing through its centre of gravity should, as in the gyroscope, tend to make it keep its original plane of rotation, is clear. That its progressive force being expended before its rotatory force, it should tend to fall in the direction of the least resistance, *i.e.* to return on its path, need not be doubted. But striking an object with violence must, one would suppose, change its plane of rotation; and then there would be no disposition to return on its path. In the notice in last week's NATURE of "Artes Africanæ" it is stated that the African boomerang is thrown so as to rotate in a horizontal plane; in which case, except by accident, there would be no tendency to return to the thrower, a mode of action supposed to be proper to the boomerang. Many know the toy boomerang made of card-board, "V" shaped, with one limb shorter than the other, say four and two and-a-half inches respectively. When this toy is laid on the smooth cover of a book held at an inclination of about 60°, and when the shorter limb projecting just beyond the edge of the book is struck with a smart fillip of the finger so as to project it rotating rapidly at an upward angle of 60°, the toy will reach the further side of a room and return; but of course if it strikes anything its plane of rotation is changed and it falls irregularly. HENRY H. HIGGINS

OUR ASTRONOMICAL COLUMN

SMALL STAR WITH GREAT PROPER MOTION.—In vol. v. of the Madras Observations, Taylor mentions having observed in 1838 or 1839 a star of the 9th magnitude near to Brisbane 3458 (which appears not to have been found), the position of which, by three observations, is thus given for 1840:—R.A. 11h. 5m. 25·71s, N.P.D. 118° 59′ 12″·62.

Argelander twice observed a star of the same magnitude (Oeltzen, Nos. 11237-8) in zones 374 and 377, 1851 April 22 and 28, the mean place of which for 1850 is in R.A. 11h. 5m. 50·98s, N.P.D. 119° 1′ 52″·95. Assuming the identity of the stars observed by Taylor and Argelander, of which there can be little doubt, the comparison of positions for 1840 and 1850, taking the date of opposition of the star in 1838 as about the epoch of Taylor's observations, unfortunately not stated, shows an annual proper motion of − 0·293s in R.A., and of − 2″·74 in N.P.D., or 4″·72 in arc of great circle in the direction 305°·5. If this amount of proper motion is confirmed, it will be fourth in order of magnitude of the great proper motions of stars yet satisfactorily ascertained, and the list will then stand as follows:—

	Proper Motion in Arc of great Circle.	Direction of Motion.	Magnitude.
	″	°	
Groombridge 1830...	7·05	145·0	7
61 Cygni ...	5·21	51·8	5½
Lalande 21185 ...	4·75	186·6	7
Taylor's star ...	4·73	305·5	9
ε Indi ...	4·63	124·8	5½
Lalande 21258 ...	4·40	282·4	8½
40 Eridani ...	4·09	212·0	4½
μ Cassiopeæ ...	3·83	115·3	5½
α Centauri ...	3·81	276·6	1

Lalande 21185, is "Argelander's second star" of Prof. Winnecke, and No. 21258 is the star called "Argelander's third" by Dr. Krüger.

If Taylor's observations of the star of ninth magnitude were made in 1839, it should be third on the above list, but the precise amount of proper motion must remain for comparison of Argelander's position obtained in 1851, with future observations, it may be hoped early in the next year.

The N.P.D. of Brisbane 3458 mentioned above, agrees exactly with that of Lacaille 4641, but the R.A. differs 1m. 8s.; the magnitudes are the same.

THE SECOND COMET OF 1702.—The first comet of this year does not figure in our catalogues of cometary orbits, no observations properly so-called having been obtained. In Europe the tail only was seen by Maraldi and Bianchini at the end of February and beginning of March. The second comet of 1702 was observed at Berlin, Paris, and Rome, in the last ten days of April and beginning of May, and orbits have been calculated by Lacaille and Burckhardt; the latter reduced the observations anew, but it does not appear what data he had besides those

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published in the "Memoirs of the Paris Academy." It is singular that the original observations of this comet, given in "Francisci Blanchini Veronensis Astronomicæ ac Geographicæ Observationes selectæ" (Verona, 1737) have not, so far as we can discover, been fully calculated. The volume is not mentioned amongst those consulted by Pingré, in the preparation of his great work, the "Cométographie," and is probably rare. A preliminary reduction of these observations exhibits considerable difference from Burckhardt's parabola, and in presence of the suspicious indications of ellipticity, small inclination and direct motion, it may result that Bianchini's observations may be sufficient to add another comet of short period to those already known—at least so far as to render probable its having moved in an elliptical orbit of small extent, at the time it was observed, which is about all that can be said in the case of the comet of 1766, or of the first comet of 1743. It is certain that it must have been very near to the earth shortly before Bianchini discovered the comet on April 20. In a short time we may have more to say respecting the movements of this body.

THE TOTAL SOLAR ECLIPSE of 1999, AUGUST 11.—In NATURE, vol. xii. p. 213, were given the elements of the eclipse of 1927, June 28, which will be total in the north of England, though only for nine or ten seconds even on the central line; it is the first total eclipse that will be visible in these islands during the ensuing century, and there is only one other eclipse that can be witnessed in its totality in England before the year 2000. It is that of 1999, August 11, of which we proceed to give some account.

The elements of the eclipse are as follows :—

Conjunction in R.A. 1999, Aug. 10, at 22h. 50m. 8s. G.M.T.

R.A.	140° 46′ 31″
Moon's hourly motion in R.A.	35 29
Sun's „ „ „	2 22
Moon's declination	15 50 11 N.
Sun's „	15 19 49 N.
Moon's hourly motion in decl.	7 44 S.
Sun's „ „ „	0 44 S.
Moon's horizontal parallax	58 43
Sun's „ „	9
Moon's true semi-diameter	16 0
Sun's „ „	15 47

The sidereal time at Greenwich mean noon on Aug. 11 is 9h. 18m. 2·0s., and the equation of time 5m. 16s. subtractive from mean time.

The central eclipse begins 21h. 29·4m. in long. 64° 49′ W., lat. 41° 11′ N.; central with sun on meridian in long. 18° 47′ E., lat. 46° 47′ N.; central eclipse ends 0h. 34·8m. in long. 87° 33′ E., lat. 17° 31′ N.

So far as regards this country the most favourable locality for observation will be in the vicinity of St. Ives, in Cornwall, which place is almost exactly on the line of central eclipse. Taking the position of St. Ives in long. 5° 26′ W., lat. 50° 12′ we find—

	h. m. s.	
Beginning of totality August 11 at	9 47 42 A.M.	local time.
Ending „ „ „	9 49 42	„ „

The duration of total eclipse is therefore 2·m.

The sun's apparent altitude at this time is 47°.

If we found equations of reduction upon this direct calculation for St. Ives, we shall have the following expressions by means of which anyone who is curious in the matter may examine the durations for such places as fall within the total eclipse :—

$$\text{Cos. } w = 70{\cdot}8267 - [2{\cdot}12739] \sin. l + [1{\cdot}70001] \cos. l, \cos. (L + 11° 55'{\cdot}6)$$
$$t = 23\text{h. } 19\text{m. } 48\text{s.} \mp [1{\cdot}78051] \sin. w - [3{\cdot}27551] \sin. l$$
$$+ [3{\cdot}92586] \cos. l, \cos. (L - 114° 40'{\cdot}1).$$

In these formulæ l is the geocentric latitude, L the longitude from Greenwich taken *negative*, and t the Greenwich mean time of beginning or ending, according as the upper or lower sign is employed; the quantities within the square brackets are logarithms.

For that portion of the zone of totality falling upon English ground we have—

Long. W.	Lat. North Limit.	Central Eclipse.	South Limit.
2° 30′	50° 35′·9	50° 8′·2	49° 40′·5
3 30	50 38·2	50 10·5	49 42·8
4 30	50 40·4	50 12·6	49 45·0
5 30	50 42·2	50 14·5	49 46·9

These results may be expected to prove pretty near the true ones, being derived from elements of the lunar motions which represent with considerable precision the circumstance of the total eclipse in England in 1715, and the annular eclipse of 1737, which was well observed at Edinburgh by Lord Aberdour and Maclaurin.

THE ZODIACAL LIGHT.—This phenomenon presented itself rather conspicuously in the neighbourhood of London on the evening of the 23rd inst., though the vaporous condition of atmosphere seriously interfered with any attempt to trace its outlines satisfactorily. The southern border of the light appeared to be better defined than the northern one, and the latter seemed to be slightly curved.

THE THEORY OF "STREAM LINES" IN RELATION TO THE RESISTANCE OF SHIPS *

IV.

SUPPLEMENTARY NOTES.—A.

THE proposition, that the flow of fluid through a tortuous pipe when its ends are in the same straight line, does not tend to push the pipe endways, can be treated in several ways, of which only one is given in the text of the address; but it may be interesting to some readers to trace some of the other ways of viewing the question.

First let us take the case of a right-angled bend in a pipe (that is to say where the direction of a pipe is altered through a right-angle by a curve of greater or less radius; a bend of this sort is shown in Fig. 29), and assume that the fluid in it at A is flowing

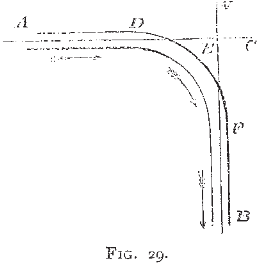

FIG. 29.

from A towards C. I propose at present to deal only with those forces or tendencies which act more or less powerfully in the direction of the original motion of the fluid, namely along the line AC.

I must here remind you that I am dealing with this matter entirely independently of hydrostatic pressure. Perhaps to some it will be difficult to dissociate the idea of hydrostatic pressure from a fluid in a pipe. This difficulty might be got over by assuming that the pipe is immersed in a fluid of the same density and head as the fluid within it. There will thus be hydrostatic equilibrium between the fluid within and without the pipe, the only difference being that the fluid inside the pipe is assumed to be in rapid motion, and thus to subject the pipe independently to any stresses properly incidental to that motion of the fluid within it.

The sole work that has to be done in the present case, is that of deflecting the current of fluid to a course at right angles to its original course AC; and, regarding these forces as resolvable throughout into two sets of components, the one at right angles to the line AC, the other parallel to it, it is of the latter alone that account is to be taken. Manifestly the sum of these components is measured by the circumstance that it is precisely sufficient to entirely destroy the forward momentum of the fluid that flows

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